HRS DOCUMENTATION RECORD COVER SHEET

Name of Site: U.S. Magnesium
EPA ID No. UTN000802704
SSID: 08PU

Contact Persons

Site Investigation:	URS Operating Services for EPA 1099 18th Street Suite 710 Denver, Colorado 80202	(303) 296-3523
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Pathways, Components, or Threats Not Scored

Ground Water Migration Pathway

The U.S. Magnesium Site (USM) is remote and located in a sparsely populated area of the Great Salt Lake valley; neither private residences nor drinking water wells were identified. In addition, the USM facility draws its potable water from a well outside the four mile radius. Based on lack of potentially impacted ground water users the ground water pathway is not scored as part of this Hazard Ranking System (HRS) package.

Surface Water Migration Pathway

The most prominent surface water feature subject to site contamination in the study area is the Great Salt Lake; however, although it is possible the site has impacted the Great Salt Lake, insufficient sampling has been performed to document an observed release to the surface water pathway. In addition, the surface water pathway has not been identified as supporting a viable fishery as defined by HRS standards. As such, the surface water pathway is not scored as part of this Hazard Ranking System (HRS) package.

HRS DOCUMENTATION RECORD

Name of Site:	U.S. Magnesium (USM)
EPA Region:	Region 8 Date Prepared: September 2008
Street Address of Site*:	Southwest shore of the Great Salt Lake, 15 miles north of the Rowley exit on I-80 (Refs. 5, p. 1; 6, Figure 2)
City, County, State, Zip Code:	Tooele County, Utah, 84029 and 84083 (Ref. 5, p. 1)
General Location in the State:	Immediately southwest of the Great Salt Lake, near Badger Island. The site reference point is the active waste surface impoundment and is marked on Reference 4, p. 1.
Topographic Map:	Badger Island NW quad (Refs. 3; 4)
Latitude: 40.914725	Longitude: -112.719725 (Refs. 3; 4)

Scores

Air Pathway	100.00
Ground Water Pathway	N/A
Soil Exposure Pathway	63.33
Surface Water Pathway	N/A
HRS SITE SCORE	**59.18**

*The street address, coordinates, and contaminant locations presented in this HRS documentation record identify the general area the site is located. They represent one or more locations EPA considers to be part of the site based on the screening information EPA used to evaluate the site for NPL listing. EPA lists national priorities among the known "releases or threatened releases" of hazardous substances; thus, the focus is on the release, not precisely delineated boundaries. A site is defined as where a hazardous substance has been "deposited, stored, placed, or otherwise come to be located." Generally, HRS scoring and the subsequent listing of a release merely represent the initial determination that a certain area may need to be addressed under CERCLA. Accordingly, EPA contemplates that the preliminary description of facility boundaries at the time of scoring will be refined as more information is developed as to where the contamination has come to be located.

WORKSHEET FOR COMPUTING HRS SITE SCORE

		S	S^2
1.	Ground Water Migration Pathway Score (S_{gw})	N/A	N/A
2a.	Surface Water Overland/Flood Migration Component (from Table 4-1, line 30)	N/A	
2b.	Ground Water to Surface Water Migration Component (from Table 4-25, line 28)	N/A	
2c.	Surface Water Migration Pathway Score (S_{sw}) Enter the larger of lines 2a and 2b as the pathway score.	N/A	N/A
3.	Soil Exposure Pathway Score (S_s) (from Table 5-1, line 22)	63.33	4,010.69
4.	Air Migration Pathway Score (S_a) (from Table 6-1, line 12)	100.00	10,000.00
5.	Total of $S_{gw}^2 + S_{sw}^2 + S_s^2 + S_a^2$		14,010.69
6.	**HRS Site Score** Divide the value on line 5 by 4 and take the square root		59.18

SOIL EXPOSURE PATHWAY SCORESHEET
REF. 1, TABLE 5-1

Factor Categories and Factors		Maximum Value	Value Assigned
RESIDENT POPULATION THREAT			
Likelihood of Exposure:			
1.	Likelihood of Exposure	550	550
Waste Characteristics:			
2.	Toxicity	a	10,000
3.	Hazardous Waste Quantity	a	1,000,000
4.	Waste Characteristics	100	100
Targets:			
5.	Resident Individual	50	0
6.	Resident Population:		
	6a. Level I Concentrations	b	0
	6b. Level II Concentrations	b	0
	6c. Resident Population (lines 6a + 6b)	b	0
7.	Workers	15	5
8.	Resources	5	0
9.	Terrestrial Sensitive Environments	c	90
10.	Targets (lines 5 + 6c + 7 + 8 + 9)	b	95
Resident Population Threat Score:			
11.	Resident Population Threat (lines 1 x 4 x 10)	b	5,225,000
NEARBY POPULATION THREAT			
Likelihood of Exposure:			
12.	Attractiveness/Accessibility	100	
13.	Area of Contamination	100	
14.	Likelihood of Exposure	500	
Waste Characteristics:			
15.	Toxicity	a	
16.	Hazardous Waste Quantity	a	
17.	Waste Characteristics	100	

Factor Categories and Factors	Maximum Value	Value Assigned
NEARBY POPULATION THREAT (Concluded)		
Targets:		
18. Nearby Individual	1	__
19. Population Within 1 Mile	b	__
20. Targets (lines 18 + 19)	b	
Nearby Population Threat Score:		
21. Nearby Population Threat (lines 14 x 17 x 20)	b	NS
SOIL EXPOSURE PATHWAY SCORE		
22. Soil Exposure Pathway Score[d] (S_s), (lines [11 + 21]/82,500, subject to a maximum of 100)	100	63.33

[a]Maximum value applies to waste characteristics category.
[b]Maximum value not applicable.
[c]No specific maximum value applies to factor. However, pathway score based solely on terrestrial sensitive environments is limited to maximum of 60.
[d]Do not round to nearest integer.

AIR MIGRATION PATHWAY SCORESHEET

REF. 1, TABLE 6-1

Factor Categories and Factors	Maximum Value	Value Assigned
Likelihood of Release:		
1. Observed Release	550	550
2. Potential to Release:		
2a. Gas Potential to Release	500	
2b. Particulate Potential to Release	500	
2c. Potential to Release (higher of lines 2a and 2b)	500	
3. Likelihood of Release (higher of lines 1 and 2c)	550	550
Waste Characteristics:		
4. Toxicity/Mobility	a	1,000
5. Hazardous Waste Quantity	a	1,000,000
6. Waste Characteristics	100	100
Targets:		
7. Nearest Individual	50	45
8. Population:		
8a. Level I Concentrations	b	0
8b. Level II Concentrations	b	400
8c. Potential Contamination	b	0
8d. Population (lines 8a + 8b + 8c)	b	400
9. Resources	5	0
10. Sensitive Environments		
10a. Actual Contamination	c	125
10b. Potential Contamination	c	0
10c. Sensitive Environments (Lines 10a + 10b)	c	90
11. Targets (lines 7 + 8d + 9 + 10c)	b	535
AIR MIGRATION PATHWAY SCORE		
12. Pathway Score (S_a), [(lines 3 x 6 x 11)/82,500][d]	100	100.00

[a]Maximum value applies to waste characteristics category.
[b]Maximum value not applicable.
[c]No specific maximum value applies to factor. However, pathway score based solely on sensitive environments is limited to maximum of 60.
[d]Do not round to nearest integer.

REFERENCES

Ref. No.	Description of the Reference
1	U.S. Environmental Protection Agency (EPA). Hazard Ranking System, 40 CFR Part 300, Appendix A. December 14, 1990. http://www.epa.gov/superfund/sites/npl/hrsres/index.htm#HRS%20Rule. The complete HRS is available in the Regional docket, upon request.
2	EPA. Superfund Chemical Data Matrix. January 2004. Excerpt. 21 pages.
3	Latitude and Longitude Calculation Worksheet for the USM Site. 2008. April 30, 2008. 1 page.
4	U.S. Geological Survey (USGS) 7.5' Series Topographic Maps. Badger Island NW 1965, 3 maps.
5	URS Operating Services, Inc. for EPA, Region 8. 2003. Sampling Activities Report, Magnesium Corporation Site. May 9, 2003. 598 pages.
6	URS Operating Services, Inc. for EPA, Region 8. 2002. Sampling Activities Report, Magnesium Corporation Site. April 10, 2002. 406 pages.
7	DeGrandchamp, Richard L. 2007. Expert Report of Dr. Richard L. DeGrandchamp, Ph.D. Regarding the Magnesium Corporation of America, Rowley, Utah. Prepared for the U. S. Department of Justice, February 6, 2007. 108 pages.
8	EPA Envirofacts Warehouse. 2008. Toxic Release Inventory Form R Reports downloaded from EPA Envirofacts database. Downloaded March 25, 2008. http://oaspub.epa.gov/enviro/tri_formr.fac_list?rptyear=2006&facopt=tris_id&fvalue=84074MXMGNROWLE&fac_search=fac_equal. 56 pages.
9	State of Utah, Department of Natural Resources, Division of Wildlife Resources. 2007. Utah Sensitive Species List. December 14, 2007. 150 pages.
10	Stratus Consulting Inc. 2007. Environmental Endangerment at the U.S. Magnesium Facility, Rowley, Utah, Expert Report. February 5, 2007. Prepared by Douglas Beltman and Mark Stackhouse. 109 pages.
11	Wharton, Steve. 2008. E-mail and attachments regarding USM Migratory Bird Rehabilitation Permits and Annual Reports. March 28, 2008. 14 pages including attachments.
12	Great Plains Nature Center. 2008. Snowy Plovers in the Great Plains fact sheet. Downloaded March 5, 2008. http://www.gpnc.org/ploverSn.htm. 2 pages.
13	Christiansen, Gwen. 2008. Interview of Steven Wharton, Risk Assessor, EPA Region 8 by Gwen Christiansen, EPA Region 8 NPL Coordinator. March 10, 2008. Subject: US Magnesium Site. 50 pages including attachments.
14	DeGrandchamp, Richard L. 2007. Expert Rebuttal Report of Dr. Richard L. DeGrandchamp, Ph.D. Regarding the Magnesium Corporation of America, Rowley, Utah. Prepared for the U. S. Department of Justice, June 15, 2007. 87 pages.

15 Christiansen, Gwen. 2008. Interview with John Works, Enforcement Specialist, EPA Region 8 by Gwen Christiansen, EPA Region 8 NPL Coordinator. April 2, 2008. Subject: Bird Mortality at U.S. Magnesium Site. 1 page.

16 State of Utah, Department of Environmental Quality, Division of Air Quality. 2003. Title V Operating Permit, number 4500030001, US Magnesium, LLC. October 11, 2001. Last Revision, June 11, 2003. 50 pages.

17 Stratus Consulting Inc. 2007. United States of America vs. Magnesium Corporation of America et al. Rebuttal Report of Douglas Beltman. June 8, 2007. Prepared by Douglas Beltman. 56 pages.

18 Christiansen, Gwen. 2008. Interview with Andy Lensink, EPA Region 8 Attorney by Gwen Christiansen, EPA Region 8 NPL Coordinator. April 10, 2008. Subject: anode box sampling and visible dust/fumes/gases at US Magnesium Site. 2 pages.

19 BIO-Logic Environmental. 2006. Report: Presence and Relative Abundance of Birds at the Old Waste Pond and Vicinity, Breeding Season 2006. December 5, 2006. Prepared by Steve Boyle, Owner/Senior Biologist. 19 pages.

20 National Response Center (NRC) Report #868366, April 18, 2008. 5 pages.

21 U.S. Fish and Wildlife Service. Threatened and Endangered Species System List for Birds. Report generated May 29, 2008. 6 pages.

22 Christiansen, Gwen. 2008. Interview with Andy Lensink, EPA Region 8 Attorney by Gwen Christiansen, EPA Region 8 NPL Coordinator. June 20, 2008. Subject: identification of anode box area on aerial photograph of the US Magnesium Site. 3 pages.

23 U.S. EPA. HRS Guidance Manual. Interim Final. EPA 540-R-92-026. November 1992. Excerpt 12 pages. http://www.epa.gov/superfund/sites/npl/hrsres/index.htm.

24 Christiansen, Gwen. 2008. E-mail and attachments regarding additional worker photos and white pelican found in ditch and collected. August 1, 2008. 12 pages including attachments.

25 Christiansen, Gwen. 2008. Interview by Gwen Christiansen, EPA Region 8 NPL Coordinator with Andy Lensink on 08/05/08. Subject: Location of worker entrance/exit and bird collection details. 2 pages.

26 U.S. EPA Region 8 Trip Report of United States Magnesium Corporation (USM) by John Works. Inspection conducted September 12, 2003. Report dated and signed March 16, 2004. 4 pages.

27 Deposition of John Works by Magnesium Corporation of America council, David Tundermann and the United States Department of Justice council Bernice Corman. November 7, 2006. 57 pages.

28 The Renco Group Inc. US Magnesium LLC. http://www.rencogroup.net/companies/usmagnesium.html. Accessed 8/6/08, 1 page.

29 Picture of active waste treatment taken on 6/1/2006 from EPA files by Emilio Llamozas, 1 page.

30 Schmidt, Cordel. Magnesium Corp. Field Logbooks #1 through #7. 5/24/01 to 2/7/03, 8/22/01 to 8/23/01, 9/8/02 to 6/18/03, 6/19/03 to 1/8/04, 9/1/04 to 10/12/04. 131 pages.

2.2 SITE DESCRIPTION

The following information is from a 2003 Sampling Activities Report Prepared by URS Operating Services for EPA (Ref. 5, pp. 1-3, Figure 2). A map showing the locations of the sources can be found in Reference 5, Figure 2.

The Magcorp/USM facility is an active manufacturing plant located in Tooele County approximately 40 miles west of Salt Lake City, 15 miles north of Interstate 80, and adjacent to the Great Salt Lake. The plant consists of numerous buildings associated with the manufacturing process, a sewage pond, a landfill, and other areas containing waste material (i.e., smut piles, barium sulfate pile, calcium sulfate pile). An earthen, open air ditch system transmits facility wastes away from facility process areas and into an earthen open air 400 acre active hazardous waste surface impoundment. Four ditches are currently utilized for this purpose: a central ditch, which is the most prominent of the three ditches that are directly connected to facility operations and flows north; a chlorine ditch that is located approximately 400 feet east of and parallel to the central ditch and also flows north; a western ditch that is found in the northwestern part of the facility near the facility smut piles and flows north then eastward; and the main ditch which drains the other three ditches. The main ditch is approximately 2,800 feet in length and is also called the "Red River" due to earth red color. The chlorine ditch is approximately 1,350 feet in length and empties into the main ditch (Ref. 6, pp. 26, 27, Figure 2). The main ditch trends predominantly west-east and terminates in the eastern portion of the property, draining into the 400 acre hazardous waste surface impoundment. An inactive 1,200 acre hazardous waste surface impoundment (located east of the active impound) was the original recipient of facility wastes but reportedly was flooded by the Great Salt Lake and taken off-line.

The USM facility has been in operation since 1972. The facility's manufacturing operations include removing minerals from the Great Salt Lake surface water and ground water brines, by concentrating the waters in solar evaporation ponds and in concentrator tanks that utilize heat from facility processes. The concentrated brine is treated to remove potassium, boron, and sulfates. The brine is then spray dried to produce an impure anhydrous magnesium rich powder. This powder is then melted and chlorinated to convert the magnesium oxide into magnesium chloride, which is then treated by an electrolysis process to separate molten magnesium metal from chlorine gas. Chlorine gas and hydrochloric acid are also produced from plant processes, and are then used in other processes or sold.

The Utah division of air quality collected a sediment sample from the central ditch in September, 1998. Analytical results indicated the presence of dioxin and hexachlorobenzene (HCB) at 31.3 parts per billion (ppb) and 320 parts per million (ppm), respectively. Three additional samples were collected by EPA in 1999 and indicated that hexachlorobenzene was present in all three samples, at concentrations ranging from 210 ppm to 400 ppm. In 2001 EPA collected samples from anode dust boxes #3 and #4, as well as six locations within the ditch system. Laboratory results indicated the presence of polychlorinated biphenyls (PCBs), arsenic, and chromium in samples.

UOS performed sampling activities in 2001 for EPA, collecting samples from the active surface impoundment, the calcium sulfate pile, the main, western, and chlorine ditches, the anode and cathode header pipes, and the wash out areas from all four anode buildings (Ref. 6, pp. 1-15, Figure 2). Results indicated the presence of contaminants in several areas (Ref. 6, pp. 1-15).

2.2.1 SOURCE IDENTIFICATION

Name of source: 1,200 acre inactive surface impoundment Number of source: 1

Source Type: pile

Description and Location of Source (with reference to a map of the site):

An approximately 1,200 acre surface impoundment is located on the northeastern portion of the facility, immediately northeast of the active surface impoundment (Ref. 6, p. 8, Figure 2). These impoundments receive mixed facility wastes and are allowed to evaporate naturally (Ref. 5, p. 2; 7, pp. 6, 8, photo 2). In addition, the liquid in the impoundments is not treated. For HRS purposes, the source is considered a pile. Piles in liquid impoundments differ from surface impoundments because the wastes are deposited with the intention of dewatering the waste and accumulating waste in one area (Ref. 23, p. 12). This was the facility waste impoundment until the Great Salt Lake breached the levee, and the facility began using the current, active 400 acre surface impoundment. This impoundment once abutted the Great Salt Lake, but due to fluctuations in the water levels of the Great Salt Lake, is currently approximately 0.25 miles from the waterline (Ref. 6, pp. 7, 8). This impoundment may pose an elevated risk to employees who come in contact with it (Ref. 7, p. 8). UOS collected four samples for EPA from three locations in the inactive surface impoundment on August 21, 2001 (all from depths of 18 inches or less) (Ref. 6, pp. 7, 8). Dioxins, furans, and PCBs were analyzed for by Triangle Laboratories of Durham, NC; semi-volatile analysis was performed by SVL Analytical, Inc. of Kellogg, Idaho, or Data Chem of Salt Lake City, UT (Ref. 6, pp. 10, 11, 19, 21, 23, App. B). All data were validated by TechLaw Inc., of Denver, Colorado (Ref. 6, pp. 7, App B, App. C, pp. 41-49, 85-96). Chain of Custody, summary forms, and raw data were evaluated in a data validation report and deemed fit to be used (Ref. 6, App. C, pp. 45, 90). The data from samples collected during various inspections over the years have found consistent results with respect to contamination with HCB, PCBs, dioxins, and furans (Refs. 5; 6). Source and sample locations can be found in Reference 6, Figure 2.

2.2.2 HAZARDOUS SUBSTANCES ASSOCIATED WITH THE SOURCE

- Source Samples:

Sample ID	Sample Type	Date	Hazardous Substance	Hazardous Substance Concentration	Reporting Limit	Ref. 6, pp. 7, 8, Figure 2, App. B, pp. xx, App. C, pp. 41-49, 85-96; 30, pp. 48, 49, 51-55
MC-SO-01S	waste*	8/21/01	PCB	1,290 ppb	370 ppb**	45
			hexachlorobenzene	2.77 ppm	0.57 ppm	78
MC-SO-01D			PCB	4,139.8 ppb	2080 ppb**	49, 50
			hexachlorobenzene	134 D ppm	32 ppm	81
MC-SO-03			PCB	1.6 ppb	0 ppb**	46
			hexachlorobenzene	ND	0.20 ppm	84
MC-SO-04			hexachlorobenzene	0.009 J ppm	0.22 ppm	85

Notes: "D" sample was diluted for analysis, but this has no effect on the accuracy of the analysis.
"J" estimated value: contaminant is present, but quantity is below the reporting limit.

"ND" not detected at stated reporting limit.
* although the samples collected from hazardous waste surface impoundment were classified as sediment samples for analytical purposes, they are source waste samples.
** when reporting total values for PCBs, the overall EMPC (Estimated Maximum Potential Contamination) value is the detection limit. This is calculated by taking the "Total PCB + EMPC" value and subtracting the reported "Total PCB" value to determine overall EMPC.

List of Hazardous Substances Associated with Source

Polychlorinated biphenyls (PCBs) and hexachlorobenzene are both chlorinated compounds associated with the facility processes and are believed to be anthropogenic in origin and therefore generated by Magcorp (Ref. 6, p. 15). Both of these contaminants have been detected in the inactive waste impoundment at concentrations exceeding the reporting limit (Ref. 5, App. B, pp. 45, 49, 50, 78, 81).

2.2.3 HAZARDOUS SUBSTANCES AVAILABLE TO A PATHWAY

Containment Description	Containment Factor Value	Ref.
Gas release to air: because the source is covered by less than one foot of uncontaminated soil, is not heavily vegetated, has exposed soil, and does not have a cover soil type that is resistant to gas migration, a containment value of 10 was assigned.	10	6, p. 8, App. A, photos 29-32
Particulate release to air: because the source is covered by less than one foot of uncontaminated soil, is not heavily vegetated, has exposed soil, and does not have a cover soil type that is resistant to gas migration, a containment value of 10 was assigned.	10	

2.4.2 HAZARDOUS WASTE QUANTITY

2.4.2.1.1 Hazardous Constituent Quantity

Description

There are no Hazardous Constituent Quantity data available for the inactive waste surface impoundment to derive a Hazardous Constituent Quantity value.

Sum (pounds): Not Scored

Hazardous Constituent Quantity Assigned Value: NS

2.4.2.1.2 Hazardous Wastestream Quantity

Description

Data are not available; therefore, it is not possible to adequately determine the Hazardous Wastestream Quantity.

Sum (pounds): NA
Sum of Wastestream Quantity/5,000 (Table 2-5): NS

Hazardous Wastestream Quantity Assigned Value: NS

2.4.2.1.3 Volume

Description:

The volume of the inactive waste surface impoundment has not been fully characterized; therefore, it is not possible to adequately determine the volume of this source.

Dimension of source (yd^3): 0

2.4.2.1.4 Area

Description

Source area 1 is evaluated as a pile (Ref. 1, Table 2-5 - p. 51591; 5, p. 2; 6, pp. 7, 8, Figure 2; 7, pp. 6, 8, photo 2; 23, p. 12). The inactive surface impoundment covers approximately 1,200 acres, and lies within approximately 0.25 mile of the southwestern shore of the Great Salt Lake (Refs. 6, pp. 7, 8, Figure 2).

By following the stated procedure outlined in Section 2.4.2 and Table 2-5, p. 51591 of the HRS (Ref. 1), the area value is assigned as follows: 52,272,000 (ft^2)/13 = 4,020,923.08

Source Type	Units (ft^2)	References
pile	52,272,000	Ref. 1, Table 2-5 - p. 51591; 5, p. 2; 6, pp. 7, 8, Figure 2; 7, pp. 6, 8, photo 2; 23, p. 12

Sum (ft^2): 52,272,000
Equation for Assigning Value (Ref. 1, Table 2-5): ft^2/13
52,272,000/13

Area Assigned Value: 4,020,923.08

2.4.2.1.5 Source Hazardous Waste Quantity Value

Highest assigned value assigned from Ref. 1, Table 2-5: 4,020,923.08

Source No. 2

Name of source: Active surface impoundment Number of source: 2

Source Type: pile

Description and Location of Source (with reference to a map of the site):

An approximately 400 acre active hazardous waste surface impoundment receives waste waters from the USM facility via the main ditch (Ref. 5, p. 5, Figure 2; 6, Figure 2). These impoundments receive mixed facility wastes and are allowed to evaporate naturally (Ref. 5, p. 2, Figure 2; 7, pp. 6, 8, photo 2). In addition, the liquid in the impoundments is not treated. For HRS purposes, this source is considered a pile. Piles in liquid impoundments differ from surface impoundments because the wastes are deposited with the intention of dewatering the waste and accumulating waste in one area (Ref. 23, p. 12). Two samples, MC-SE-05 and MC-SE-06 were collected from the impoundment on both sides, east and west (Ref. 5, p. 5). The liquid phase of the impoundment had been verified by laboratory testing to have a pH of 1.3 in 2001 (Ref. 5, p. 5). Data associated with the Source 2 samples were validated by Techlaw, Inc. of Denver, Colorado (Ref. 5, App. C, pp. 1-19, 101-120, 141-159, 248-268, 229-249). The data from samples collected during various inspections over the years have found consistent results with respect to contamination with HCB, PCBs, dioxins, and furans (Refs. 5; 6). Sediment samples collected in the active impoundment exhibited high concentrations of dioxins/furans (up to 0.66 ppb [TEQ]), PCBs up to 2,303 ppb, and HCB up to 18 D ppm (Ref. 5, pp. 4, 5, 19, 21, 23).

2.2.2 HAZARDOUS SUBSTANCES ASSOCIATED WITH THE SOURCE

- Source Samples:

Sample ID	Sample Type	Date	Hazardous Substance	Hazardous Substance Concentration	Method Detection Limit	Ref. 5, pp. 19-23, 125, Figure 2, App. B, pp. XXX; App. C, pp. XXX; 30, pp. 77, 81
MC-SE-05	waste*	9/16/02	PCB	674.4 ppt	N/A	69; 101-120
			hexachlorobenzene	4.0 ppm	0.20 ppm	134; 248-268
MC-SE-06	waste*	9/19/02	PCB	2,302.6 ppt	N/A	78; 141-159
			hexachlorobenzene	18 D ppm	0.046 ppm	125; 229-249
			2,3,7,8 Tetrachlorodibenzo-p-dioxin (TCDD)	0.005 ppb	0.002 ppb	21; 1-19

Notes: "D" sample was diluted for analysis, but this has no effect on the accuracy of the analysis.
* although the samples collected from hazardous waste surface impoundment were classified as sediment samples for analytical purposes, they are source waste samples.
"N/A" not applicable.

List of Hazardous Substances Associated with Source

Polychlorinated biphenyls (PCBs) and hexachlorobenzene are both chlorinated compounds associated with the facility processes and are believed to be anthropogenic in origin and therefore generated by Magcorp (Ref. 6, p. 15), which is the only probable source in the area. Both of these contaminants have been detected in the active waste impoundment at concentrations exceeding the method detection limit (Ref. 6, App. B, pp. 134, 135).

2.2.3 HAZARDOUS SUBSTANCES AVAILABLE TO A PATHWAY

Containment Description	Containment Factor Value	Ref.
Gas release to air: because the source is covered by less than one foot of uncontaminated soil, is not heavily vegetated, has exposed soil, and does not have a cover soil type that is resistant to gas migration, a containment value of 10 was assigned.	10	5, p. 19, photo 95; 29
Particulate release to air: because the source is covered by less than one foot of uncontaminated soil, is not heavily vegetated, has exposed soil, and does not have a cover soil type that is resistant to gas migration, a containment value of 10 was assigned.	10	

2.4.2 HAZARDOUS WASTE QUANTITY

2.4.2.1.1 Hazardous Constituent Quantity

Description

There are no Hazardous Constituent Quantity data available for the active waste surface impoundment to derive a Hazardous Constituent Quantity value.

Sum (pounds): Not scored (NS)

Hazardous Constituent Quantity Assigned Value: NS

2.4.2.1.2 Hazardous Wastestream Quantity

Description

Data are not available; therefore, it is not possible to adequately determine the Hazardous Wastestream Quantity.

Sum (pounds): NS
Sum of Wastestream Quantity/5,000 (Table 2-5): NA

Hazardous Wastestream Quantity Assigned Value: NS

2.4.2.1.3 Volume

Description:

The volume of the active waste surface impoundment has not been fully characterized; therefore, it is not possible to adequately determine the volume of this source.

Dimension of source (yd^3): 0

2.4.2.1.4 Area

Description

Source area 2 is evaluated as a pile (Ref. 1, Table 2-5 - p. 51591; 5, pp. 2, 4, 5, Figure 2; 7, pp. 6, 8, photo 2; 23, p. 12). The active surface impoundment covers approximately 400 acres, and abuts the inactive waste surface impoundment (Ref. 5, pp. 4, 5, Figure 2; 6, Figure 2).

By following the stated procedure outlined in Section 2.4.2 and Table 2-5, p. 51591 of the HRS (Ref. 1), the area value is assigned as follows: 17,424,000 (ft^2)/13 = 1,340,307.69

Source Type	Units (ft^2)	References
pile	17,424,000	Ref. 5, pp. 2, 4, 5, Figure 2; 6, Figure 2; 7, pp. 6, 8, photo 2; 23, p. 12

Sum (ft^2): 17,424,000
Equation for Assigning Value (Ref. 1, Table 2-5): 17,424,000 (ft^2)/13 = 1,340,307.69

Area Assigned Value:1,340,307.69

2.4.2.1.5 Source Hazardous Waste Quantity Value

Highest assigned value assigned from Ref. 1, Table 2-5: 1,340,307.69

Name of source: Anode dust boxes Number of source: 3

Source Type: Container

Description and Location of Source (with reference to a map of the site):

The anode dust boxes are part of a header system within the electrolytic process that is designed to collect off-gasses and dust by-products (Ref. 6, p. 3). The anode dust boxes are the locations where the accumulated anode dust is physically removed from the system in the outside courtyard (Ref. 6, p. 3; 22). The dust is removed from the dust boxes by workers using a shovel, with no form of dust collection or control procedures in place (Ref. 6, photograph 17). Other documents refer to this source as the "grizzly box" (Ref. 7, p. 7). Four anode dust boxes are present at the facility in the courtyard west of the stack, although one was reportedly out of service at the time of the inspection (Ref. 6, p. 3; 22). The anode dust boxes themselves are approximately two feet by three feet by six feet in size (Ref. 22). The EPA Environmental Response Team (ERT) performed a grain size analysis on dust recovered from anode dust boxes #3 and #4 with approximately 90% of the material measuring 0.9 microns in size (Ref. 6, p. 3, photos 1-7, 13).

Two samples were collected from the dust boxes in this area; MC-DU-01, and MC-DU-04 (Ref. 6, pp. 3-6). These samples were analyzed by DataChem of Salt Lake City, UT, Paradigm Analytical Labs of Wilmington, NC, and Southwest Laboratory of Oklahoma, Broken Arrow, OK for SVOCs, PCBs, and dioxin/furans, respectively (Ref. 6, pp. 3-6, Figure 2). All results were validated by Techlaw of Denver, CO (Ref. 6, p. 6, App. C, pp. 76-84, 123-131). Chain of Custody, summary forms, and raw data were evaluated in a data validation report and deemed fit to be used (Ref. 6, App. C, pp. 80, 127). The data from samples collected during various inspections over the years have found consistent results with respect to contamination with HCB, PCBs, dioxins, and furans (Refs. 5; 6). PCB concentrations for these samples were as high as 57,111 ppb and HCB concentrations up to 2,000 J ppm (Ref. 6, pp. 22, 24). Anode dust from these sources was observed to be very light and easily spread by slight winds; in 2002, anode box dust sampling dispersed rapidly, filling the courtyard area (Refs. 6, p. 4, photo 5; 18, p. 2).

2.2.2 HAZARDOUS SUBSTANCES ASSOCIATED WITH THE SOURCE

- Source Samples:

Sample ID	Date	Hazardous Substance	Hazardous Substance Concentration	Sample Reporting Limit	Ref. 6, Figure 2, App. B, pp. xxx; App. C, pp. 76-84, 123-131; 30, pp. 8-10
MC-DU-01	5/25/01	PCB	57,111 ppb	1.17 ppb	74
		HCB	2,000 J ppm	4.3 ppm	173, 174
		Arsenic	240 J ppm	22 ppm	176
		Chromium	320 J ppm	0.45 ppm	176
		Mercury	0.664 ppm	0.0310 ppm	178
MC-DU-04		PCB	34,560 ppb	1.21 ppb	75
		HCB	820 J ppm	4.3 ppm	171, 172
		Arsenic	110 J ppm	22 ppm	175
		Chromium	270 J ppm	0.44 ppm	175
		Mercury	0.0524 ppm	0.0305 ppm	177

Notes: "J" quantity is estimated because the QC criteria were not met; specifically, the internal standard recoveries were outside of (below) QC criteria

List of Hazardous Substances Associated with Source

Sampling performed during the earlier site visit on May 25, 2001, at anode dust boxes #1 and #4, indicated that observed dioxin/furan (D/F), PCB, and HCB amounts were the highest detected on site at 13.25 ppb, 57,111 ppb, and 2,000 J ppm, respectively (Ref. 6, p. 14). The anode dust box samples are also the only samples presented in the Sampling Activities Report (Reference 6) that were analyzed for TAL Total and TCLP metals (Ref. 6, p. 14). Total iron content in sample MC-DU-01 (anode dust box #1) was 120,000 ppm and TCLP arsenic content was observed at 5.5 ppm (Ref. 6, p. 14). Also, TCLP chromium in samples MC-DU-01 and MC-DU-04 (anode dust box #4) was observed at 19 ppm and 11 ppm, respectively (Ref. 6, p. 14). (While iron is not considered a CERCLA hazardous substance at this site, its presence is noted to provide comprehensive background information. Its presence is not included in the HRS scoring.) Anode dust material is considered a hazardous waste with regard to its ability to leach hazardous material beyond EPA regulatory limits (Ref. 6, p. 14). Anode dust was also observed by START2 (while under direction from EPA) to spread easily when it became airborne in a slight wind (Ref. 6, p. 14). Non-visible chlorine gas caused chlorine monitors to alarm at 8.4 ppm (Refs. 6, p. 14, photo 5; 18, pp. 1, 2).

2.2.3 HAZARDOUS SUBSTANCES AVAILABLE TO A PATHWAY

Containment Description	Containment Factor Value	Refs.
Gas release to air: because the source does not consist solely of intact, sealed containers that are totally protected from weather by regularly inspected, maintained cover, a value of 10 is assigned.	10	1, Tables 6-3 and 6-9; 6, pp. 4, 8, photos 1-17; 18, pp. 1, 2
Particulate release to air: because the containers do not contain only liquids; the containers are not intact, sealed, and totally protected from weather by regularly inspected, maintained cover; and the containers are not intact and sealed, a value of 10 is assigned.	10	

2.4.2 HAZARDOUS WASTE QUANTITY

2.4.2.1.1 Hazardous Constituent Quantity

Description

There are no Hazardous Constituent Quantity data available for the anode dust boxes to derive a Hazardous Constituent Quantity value.

Sum (pounds): Not scored (NS)

Hazardous Constituent Quantity Assigned Value: NS

2.4.2.1.2 Hazardous Wastestream Quantity

Description

Data are not available; therefore, it is not possible to adequately determine the Hazardous Wastestream Quantity.

Sum (pounds): NS
Sum of Wastestream Quantity/5,000 (Table 2-5): NS

Hazardous Wastestream Quantity Assigned Value: NS

2.4.2.1.3 Volume

Description

Source area 3 is evaluated as source type container (Ref. 1, Table 2-5 - p. 51591; Ref. 7, pp. 11, 32). The anode dust boxes are approximately 1.33 cubic yards in volume (36 cubic feet). However, for scoring purposes the volume is evaluated as greater than zero but total amount unknown (Refs. 6, photos 5, 6; 7, photo 17; 18, p. 2; 22; 1, Table 2-5, p. 51591).

Source Type	Units (yd^3)	References
Container	>0 but total amount unknown	Ref. 1, Table 2-5 - p. 51591

Sum (yd^3):
Equation for Assigning Value (Ref. 1, Table 2-5): $yd^3/2.5$

Volume Assigned Value: >0 but total amount unknown

2.4.2.1.4 Area

Since the volume measure was determined, the area measure was not evaluated (Ref. 1, p 51591, Section 2.4.2.1.4).

Area Assigned Value: 0

2.4.2.1.5 Source Hazardous Waste Quantity Value

Highest assigned value assigned from Ref. 1, Table 2-5: >0 but total amount unknown

Name of source: Stack/fugitive air emissions Number of source: 4

Source Type: other

Description and Location of Source (with reference to a map of the site):

USM is one of the largest producers of magnesium in the United States, and in the world (Ref. 6, p. 2). USM's manufacturing operations include removing minerals from the Great Salt Lake surface water and ground water brines by concentrating the waters in solar evaporation ponds and in concentrator tanks that utilize heat from facility processes (Ref. 6, p. 2). The concentrated brine is treated to remove potassium, boron, and sulfates (Ref. 6, p. 2). The brine is then spray dried to produce an impure anhydrous magnesium-rich powder (Ref. 6, p. 2). This powder is then melted and chlorinated to convert the magnesium oxide powder into magnesium chloride, which is treated by an electrolysis process to separate molten magnesium metal from chlorine gas (Ref. 6, p. 2). The magnesium metal is then cast into desired products (Ref. 6, p. 2). The chlorine gas and hydrochloric acid generated in the electrolytic refining process are captured and then recycled or sold (Ref. 6, p. 2). The opportunity for fugitive emissions as well as emissions from the onsite stack to be released into the atmosphere is present for several contaminants. According to Form R Reports of the Toxic Release Inventory (TRI), the most recent information from the USM facility shows that dioxins, hexachlorobenzene, and PCBs have all been attributed to both source and non-point source air releases (Ref. 8, pp. 10, 17, 50, 51). TRI trend data indicate that these releases have been steady or increasing over the last six years (Ref. 8, p. 56). The USM site has a Title V operating permit issued by the State of Utah for onsite air quality, to address some of the contaminants from several waste management areas (Ref. 16, pp. 9-11). The data from samples collected during various inspections over the years have found consistent results with respect to contamination with HCB, PCBs, dioxins, and furans (Refs. 5; 6).

2.2.2 HAZARDOUS SUBSTANCES ASSOCIATED WITH THE SOURCE

- Source Samples: information regarding this source comes from the TRI: as such, no specific sample ID is available. For stack location, please see Reference 6, Figure 2.

2.2.3 HAZARDOUS SUBSTANCES AVAILABLE TO A PATHWAY

Containment Description	Containment Factor Value	Ref.
Gas release to air: a containment value of 10 was assigned because none of the situations specifically listed in Table 6-3 of the HRS were met. Gases are being released directly to the atmosphere.	10	1, p. 51652
Particulate release to air: a containment value of 10 was assigned because none of the situations specifically listed in Table 6-9 of the HRS were met. Particulates are being released to the atmosphere.	10	1, p. 51653

2.4.2 HAZARDOUS WASTE QUANTITY

2.4.2.1.1 Hazardous Constituent Quantity

Description

The TRI Form R Reports for the USM facility show that dioxins, hexachlorobenzene, and PCBs have all been attributed to both source and non-point source air releases for several years. However, because the exact amount of these substances that has been released over the entire operating period of the facility is unknown, a Hazardous Constituent Quantity value of greater than zero but total amount unknown is assigned.

Sum (pounds): Not available (NA)

Hazardous Constituent Quantity Assigned Value: > 0 but total amount unknown

2.4.2.1.2 Hazardous Wastestream Quantity

Description

Since the Hazardous Constituent Quantity measure was determined, the Hazardous Wastestream Quantity measure was not evaluated (Ref. 1, p 51591, Section 2.4.2.1.1).

Hazardous Wastestream Quantity Assigned Value: 0

2.4.2.1.3 Volume

Description:

Since the Hazardous Constituent Quantity measure was determined, the Volume measure was not evaluated (Ref. 1, p 51591, Section 2.4.2.1.1).

Dimension of source (yd^3): 0

2.4.2.1.4 Area

Description

Since the Hazardous Constituent Quantity measure was determined, the Area measure was not evaluated (Ref. 1, p 51591, Section 2.4.2.1.1).

Area Assigned Value: 0

2.4.2.1.5 Source Hazardous Waste Quantity Value

Highest assigned value assigned from Ref. 1, Table 2-5: >0 but total amount unknown

SUMMARY OF SOURCE DESCRIPTIONS

Source No.	Source Hazardous Waste Quantity Value	Source Hazardous Constituent Quantity Complete? (Y/N)	Containment Factor Value by Pathway				
			Ground Water (GW) (Ref. 1, Table 3-2)	Surface Water (SW)		Air	
				Overland/flood (Ref. 1, Table 4-2)	GW to SW (Ref. 1, Table 3-2)	Gas (Ref. 1, Table 6-3)	Particulate (Ref. 1, Table 6-9)
1	4,020,923.08	N	NS	NS	NS	10	10
2	1,340,307.69	N	NS	NS	NS	10	10
3	>0 but total amount unknown	N	NS	NS	NS	10	10
4	>0 but total amount unknown	N	NS	NS	NS	10	10

2.4.2.2 Hazardous Waste Quantity Factor Value

According to Table 2-6 in the HRS, based on a total Hazardous Waste Quantity value of 5,361,231, the Hazardous Waste Quantity factor value is 1,000,000 (Ref. 1, Table 2-6, p. 51591).

Source Hazardous Waste Quantity Factor Value: 1,000,000

Description of Other Possible Sources:

Several other possible sources have been identified during previous site investigations: the calcium sulfate pile; the main, western, and chlorine ditches; anode and cathode header pipe areas, smut piles, and the barium sulfate pile have all been identified as having various concentrations of PCBs, dioxins, and/or HCB in the past (Refs. 5, pp. 12-15; 6, p. 3, Figure 2).

5.0 SOIL EXPOSURE PATHWAY

5.0.1 GENERAL CONSIDERATIONS

Letters by which these areas are to be identified: A and B

Names of areas: 1,200 acre inactive surface impoundment (A) and 400 acre active surface impoundment (B)

Locations and descriptions of areas (with references to a map of the site):

Area of Observed Contamination (AOC) A: An approximately 1,200 acre surface impoundment is located on the northeastern portion of the facility, immediately northeast of the active surface impoundment (Ref. 6, pp. 8, Figure 2). This was the facility waste impoundment until the Great Salt Lake breached the levee, and the facility began using the current, active 400 acre surface impoundment-both of which are in contact with, and are/were fed by the Red River ditch system (Ref. 6, Figure 2). This impoundment once abutted the Great Salt Lake, but due to fluctuations in the Great Salt Lake water levels, is currently approximately 0.25 miles from the waterline (Ref. 6, pp. 7, 8.) This impoundment may pose an elevated risk to employees who come in contact with it (Ref. 7, p. 8; 11; 24; 25). UOS collected four samples for EPA from three locations in the inactive surface impoundment on August 21, 2001 (all from depths of 18 inches or less) (Ref. 6, pp. 7, 8). Dioxins, furans, and PCBs were analyzed for by Triangle Laboratories of Durham, NC; semi-volatile analysis was performed by SVL Analytical, Inc. of Kellogg, Idaho, or DataChem of Salt Lake City, UT (Ref. 6, pp. 10, 11, 19, 21, 23, App. B). All data were validated by TechLaw Inc., of Denver, Colorado (Ref. 6, pp. 7, App. B, App. C, pp. 50-58, 85-96, 109-122). Chain of Custody, summary forms, and raw data were evaluated in a data validation report and deemed fit to be used (Ref. 6, App. C, pp. 45, 55, 115). The data from samples collected during various inspections over the years have found consistent results with respect to contamination with HCB, PCBs, dioxins, and furans (Refs. 5; 6). Because these samples contain hazardous substances attributable to the site that are present at concentrations significantly above background levels for the site, and because these samples were all collected from less than two feet below land surface (bls), the entire source may be considered an area of observed contamination for soil exposure (Refs. 6, pp. 7, 8; 1, p. 51646).

Area of Observed Contamination (AOC) B: An approximately 400 acre active hazardous waste surface impoundment receives waste waters from the USM facility via the main ditch (Ref. 5, p. 5, Figure 2; 6, Figure 2). Two samples, MC-SE-05 and MC-SE-06 were collected from the surface of the impoundment on both sides, east and west (Ref. 5, p. 5). The liquid phase of the impoundment had been verified by laboratory testing to have a pH of 1.3 in 2001 (Ref. 5, p. 5). Data associated with these samples were validated by Techlaw, Inc. of Denver, Colorado (Ref. 5, App. C, pp. 1-19, 101-120, 141-159, 248-268, 229-249). The data from samples collected during various inspections over the years have found consistent results with respect to contamination with HCB, PCBs, dioxins, and furans (Refs. 5; 6). Sediment samples collected in the active impoundment exhibited high concentrations of dioxins/furans (up to 0.66 ppb [TEQ]), PCBs up to 2,303 ppb, and hexachlorobenzene (HCB) up to 18 D ppm (Ref. 5, pp. 4, 5, 19, 21, 23). Because these samples contain hazardous substances attributable to the site that are present at concentrations significantly above background levels for the site and because these samples were all collected from less than two feet below land surface (bls), the entire source may be considered an area of observed contamination for soil exposure (Refs. 5, p. 5; 1, p. 51646).

- Background Concentrations:

Sample ID	Sample Medium	Depth	Date	Reference
MC-SO-08	soil	< 6”	8/21-23/01	Ref. 6, pp. 10, 19, 21, 23, Figure 2; 30, pp. 60, 61
MC-SO-10				

Sample ID	Hazardous Substance	Concentration (unit)	Sample Detection Limit	Ref. 6, Figure 2, App. B, pp. xxx; App. C, pp. xxx; 30, pp. 60, 61
MC-SO-08	PCB	4.1 ppb	0.3 ppb	59; 50-58
	hexachlorobenzene	0.014 J ppm	0.17 ppm	127-129; 109-122
MC-SO-10	hexachlorobenzene	0.17 U ppm	0.17 ppm	156-158; 109-122

Notes: "J" estimated value: contaminant is present, but quantity is below the reporting limit.
"U" substance was analyzed for but not detected above the level of the associated value or the sample detection limit.

These samples were collected from undisturbed soils at the outer edges of the facility to serve as backgrounds, unaffected by plant processes (Ref. 6, pp. 10, 12, Figure 2). These samples were collected as the nearest samples to the site without impact from the plant processes (Ref. 6, pp. 10, 12, Figure 2).

- Contaminated Samples

AOC A

Sample ID	Sample Medium	Depth	Date	Reference
MC-SO-01S*	Sediment*	<18"	8/21/01	Ref. 6, pp. 7, 8, App. B, pp. 45, 78, 49, 50, 81; 30, pp. 48, 49, 51-55
MC-SO-01D*				

Note: * although the samples collected from the hazardous waste surface impoundments were classified as sediment samples for analytical purposes, they are source waste samples.

AOC B

Sample ID	Sample Medium	Depth	Date	Reference
MC-SE-05	Sediment*	<18"	9/16/02	Ref. 5, pp. 5, App. B, pp. 21, 69, 78, 125, 134; 30, pp. 77, 81
MC-SE-06			9/18/02	

Note: * although the samples collected from the hazardous waste surface impoundments were classified as sediment samples for analytical purposes, they are source waste samples.

- Source Samples, AOC A

Sample ID	Hazardous Substance	Hazardous Substance Concentration	Reporting Limit	Ref. 6, Figure 2, App. B, pp. xx; App. C, pp. xx; 30, pp. 48, 49, 51-55
MC-SO-1S*	PCB	1,290 ppb	370 ppb**	45; 41-49
	hexachlorobenzene	2.77 ppm	0.57 ppm	78; 85-96
MC-SO-01D*	PCB	4,139.8 ppb	2080 ppb**	49, 50; 41-49
	hexachlorobenzene	134 D ppm	32 ppm	81; 85-96

Notes: * although the samples collected from the hazardous waste surface impoundments were classified as sediment samples for analytical purposes, they are source waste samples.
** when reporting total values for PCBs, the overall EMPC (Estimated Maximum Potential Contamination) value is the detection limit. This is calculated by taking the "Total PCB + EMPC" value and subtracting the reported

"Total PCB" value to determine overall EMPC.
"D" sample was diluted for analysis, but this has no effect on the accuracy of the analysis.

- Source Samples, AOC B

Sample ID	Hazardous Substance	Hazardous Substance Concentration	Method Detection Limit	Ref. 5, pp. 19-23, 125, Figure 2, App. B, pp. XXX; App. C, pp. XXX; 30, pp. 77, 81
MC-SE-05	PCB	674.4 ppt	N/A	69; 101-120
	hexachlorobenzene	4.0 ppm	0.20 ppm	134; 248-268
MC-SE-06	PCB	2,302.6 ppt	N/A	78; 141-159
	hexachlorobenzene	18 D ppm	0.046 ppm	125; 229-249
	2,3,7,8 Tetrachlorodibenzo-p-dioxin (TCDD)	0.005 ppb	0.002 ppb	21; 1-19

Notes: "D" sample was diluted for analysis, but this has no effect on the accuracy of the analysis.
"N/A" not applicable.

Area Hazardous Waste Quantity

- Hazardous Constituent Quantity:

Description

There are no Hazardous Constituent Quantity data available for AOCs A and B to derive a Hazardous Constituent Quantity value.

Sum (pounds): Not available (NA)

Hazardous Constituent Quantity Assigned Value: NS

Hazardous Constituent Quantity Complete? No

- Hazardous Wastestream Quantity:

Description

Data are not available; therefore, it is not possible to adequately determine the Hazardous Wastestream Quantity.

Sum (pounds): NA
Sum of Wastestream Quantity/5,000 (Table 5-2): NA

Hazardous Wastestream Quantity Assigned Value: NS

- Volume:

Description

The volumes of the inactive and active waste surface impoundments have not been fully characterized; therefore, it is not possible to adequately determine the volume of these sources.

Dimension of source (yd^3): NS

- AOC A Area:

Description

Source area 1 is evaluated as a pile (Ref. 1, Table 5-2 - p. 51647; 6, pp. 7, 8; 23, p. 12). The inactive surface impoundment covers approximately 1,200 acres, and lies within approximately 0.25 mile of the current southwestern shore of the Great Salt Lake (Ref. 6, pp. 7, 8).

By following the stated procedure outlined in Section 5.1.2.2 and Table 5-2, p. 51647 of the HRS (Ref. 1), the area value is assigned as follows: 52,272,000 (ft^2)/34 = 1,537,411.77

Source Type	Units (ft^2)	References
pile	52,272,000	Ref. 1, Table 5-2 - p. 51647; 6, pp. 7, 8; 23, p. 12

Sum (ft^2): 52,272,000
Equation for Assigning Value (Ref. 1, Table 5-2): A/34

Area Assigned Value: 1,537,411.77

- AOC B Area:

Description

Source area 2 is evaluated as a pile (Ref. 1, Table 5-2 - p. 51647; 5, pp. 2, 4, 5, Figure 2; 7, pp. 6, 8, photo 2; 23, p. 12). The active surface impoundment covers approximately 400 acres, and abuts the inactive waste surface impoundment (Ref. 5, pp. 4, 5, Figure 2; 6, Figure 2).

By following the stated procedure outlined in Section 5.1.2.2 and Table 5-2, p. 51647 of the HRS (Ref. 1), the area value is assigned as follows: 17,424,000 (ft^2)/34 = 512,470.58

Source Type	Units (ft^2)	References
pile	17,424,000	Ref. 5, pp. 2, 4, 5, Figure 2; 6, Figure 2; 7, pp. 6, 8, photo 2; 23, p. 12

Sum (ft^2): 17,424,000
Equation for Assigning Value (Ref. 1, Table 5-2): 17,424,000 (ft^2)/34 = 512,470.58

Area Assigned Value: 512,470.58

Area Hazardous Waste Quantity Value: 2,049,882.3

5.1 RESIDENT POPULATION THREAT

5.1.1 LIKELIHOOD OF EXPOSURE

Two samples collected from the inactive surface impoundment have met the requirements for documenting observed contamination (i.e., significance above background, a waste quantity value greater than zero, and depth less than 24 inches bls) (Ref. 1, p. 51646). In addition, this area is regularly occupied by employees who maintain the impoundment and/or collect any wildlife that died on the source (Refs. 11, pp. 3-10; 24; 25). Various documents demonstrate that workers have to go on, in, or near the areas of observed contamination to collect dead or dying birds (Refs. 11; 24; 25).

Sample ID	Distance of Population/Resource from Area of Observed Contamination	Reference
MC-SO-01S	On site	6, Figure 2, App. B, pp. 45, 78, 49, 50, 81; 11; 24; 25; 30, pp. 48, 49, 51-55
MC-SO-01D		

Resident Population Threat Likelihood of Exposure Factor Category Value: 550

5.1.2 WASTE CHARACTERISTICS

5.1.2.1 Toxicity

Hazardous Substance	Toxicity Factor Value	Reference
PCBs	10,000	2, p. BI-10
hexachlorobenzene	1,000	2, p. BI-7

Toxicity Factor Value: 10,000

5.1.2.2 Hazardous Waste Quantity

Area Letter	Source Type	Area Hazardous Waste Quantity
A inactive	pile	1,537,411.77
B active	pile	512, 470.58

Sum of Values: 2,049,882.35

Hazardous Waste Quantity Factor Value: 1,000,000
(Ref. 1, Table 2-6)

5.1.2.3 Calculation of Waste Characteristics Factor Category Value

Toxicity Factor Value: 10,000
Hazardous Waste Quantity Factor Value: 1,000,000

Toxicity Factor Value x Hazardous Waste Quantity Factor Value: 100,000,000

Waste Characteristics Factor Category Value: 100
(Ref. 1, Table 2-7)

5.1.3 TARGETS

Level I Concentrations

No samples were collected that would support Level I contamination.

5.1.3.1 Resident Individual

Area Letters: A and B
Level of Contamination (Level I/Level II): No residents have been documented as living on and within 200 feet of observed contamination; as such, no value has been assigned to actual contamination of a resident population.

Resident Individual Factor Value: 0

5.1.3.2 Resident Population

N/A

5.1.3.3 Workers

The USM facility currently employs approximately 400 workers (Refs. 7, p. 6; 28). The buildings that are occupied by employees are all located within one quarter mile of the anode grizzly boxes (Refs. 7, photo 1; 25). In addition, all of the workers must enter and exit the facility within one quarter mile of the stack at the beginning and end of each shift (Refs. 7, photo 1; 25). Of the workers, 30 were included in a toxicological evaluation and risk assessment to determine the impact, if any, from contact with contaminants onsite (Ref. 14, pp. 4, 11-14). Elevated worker blood levels were found for hexachlorobenzene (HCB) and dioxins (Ref. 7, pp. 1, 2). When comparing worker blood levels for HCB over a two year period of management mitigation efforts, no decrease was observed in workers, which would be expected with HCB (Ref. 7, p. 35). In fact, the HCB levels increased in all workers (Ref. 7, p. 35). Employees that did not work in the production areas, such as clerical workers, had a mean blood concentration of HCB ten times higher than levels detected in production employees (Ref. 7, p. 33). The administratively classified non-production workers were found to include women of childbearing age and are a particularly sensitive population (Ref. 7, p. 34). The anode (grizzly) box dust on the outside of the building in the courtyard is physically removed by workers by shovel outside releasing the dust to the air and the soil (Refs. 7, p. 7, photo 17; 18, p. 2). Near the area where releases are caused by removal of anode dust from the grizzly boxes, evidence of non-protected workers smoking was found (Ref. 7, p. 43, photo 17). In a later, reevaluation of the risk assessment, it was concluded that health risks were higher than previously reported (Ref. 14, pp. 5. 6). Additionally, at least one worker is needed to collect the dead birds under the USFW bird collection permit over the entire site (Refs. 11, pp. 1-13; 24, pp. 10, 11, 12; 25). On April 17, 2008, workers called in to report releases of chlorine and sulfuric acid outdoors from over 80,000 gallons of waste poured directly into the Red River drainage ditch that killed birds flying over the plant (Ref. 20, pp. 1, 2). They also reported the company uses improper procedures and

protocol when dealing with hazardous materials that are affecting workers and the environment (Ref. 20, p. 2). The report stated that when workers were injured with burns and respiratory problems from hazardous wastes on the job, they would be fired if they made a complaint or filed a report (Ref. 20, p. 2). Various documents demonstrate that workers have to go on, in, or near the areas of observed contamination to collect dead or dying birds (Refs. 11; 24; 25). Although the facility employs approximately 400 people, it is unknown how many come in contact with the active and inactive impoundments; as such, the number of workers coming in contact with these sources are expected to be greater than 1 to be conservative (Refs. 7, p. 6; 11, pp. 1-13; 24, pp. 10, 11, 12; 25; 28).

Area Letter	Number of Workers	Reference
A	1 or more	7, pp. 6, 8; 11; 24, pp. 10, 11, 12
B	1 or more	7, pp. 6, 8; 11; 24, pp. 10, 11, 12

Total workers: 1

Workers Factor Value: 5
(Ref. 1, Table 5-4)

5.1.3.4 Resources

Resource Descriptor(s): There is no commercial agriculture, silviculture, or commercial livestock production or grazing within the area of observed contamination.

Resources Factor Value: 0

5.1.3.5 Terrestrial Sensitive Environments

The State of Utah's Division of Wildlife Resources' Administrative Rule R657-48 requires development of the Utah Sensitive Species List (Ref. 9, p. 1). By Rule, wildlife species that are federally listed, candidates for federal listing, or for which a conservation agreement is in place automatically qualify for the Utah Sensitive Species List (Ref. 9, p. 1). Additional species that qualify for the list are "wildlife species of concern," species for which there is credible scientific evidence to substantiate at threat to continued population viability (Ref. 9, p. 1). The Wildlife Species of Concern and Habitat Designation Committee within the Utah Department of Natural Resources was established by the Rule to define the Utah Sensitive Species List and procedures for designation of state wildlife species of concern as part of a process to preclude listing under the Endangered Species Act (Ref. 9, p. 1, Appendix B).

Listed Utah sensitive species including the Long-billed Curlew (*Numenius americanus*) and American White Pelican (*Pelecanus erythrorhynchos*) have been observed in the USM facility study area (Refs. 9, p. 5; 11, pp. 1-9; 10, pp. 2-3, 2-7 to 2-12; 24, p. 10). A report from 2007 has documented the presence of both these species in the general vicinity of the site (Ref. 10, pp. 2-7 and 2-8). Long- billed Curlews have been observed in the area of the inactive waste impoundment and American White Pelicans have been observed coming into contact with facility wastewaters in the active surface impoundment (Ref. 10, pp. 2-3, 2-7 to 2-12). Additionally, the U. S. Fish and Wildlife has issued onsite Migratory Bird Rehabilitation Permits that require USM to submit annual reports (Ref. 11, pp. 1-11). These reports documented the death and disposal of several American White Pelicans onsite between 2002 and 2007 (Refs. 11, pp. 1-9; 24, p. 10). Incidents of birds dying after contact with the source of waste (the main ditch, or "red river") in the current impoundment have been reported by inspectors (Refs. 15; 24, pp. 10, 11, 12).

Also, the range of the Snowy Plover (*Charadrius alexandrinus*) has been identified in the immediate area of the inactive impoundment (Ref. 10, pp. 2-7 to 2-12). Although Snowy Plover populations in many locations are listed as

a Threatened species on the Federal Endangered Species List, the population at the site is not specifically listed (Ref. 21, p. 4). Additionally, the Snowy Plover's habitat in the Great Plains is typified by alkali and dry mudflats, and sandy areas along river channels (Ref. 12, p. 1). The old waste pond has these characteristics and several Snowy Plovers and their nests have been found there (Ref. 10, pp. 4-26 to 4-30; 19, p. 9). Therefore, the immediate study area has been described as a relatively small in size area that is important to the maintenance of unique biotic communities such as the Snowy Plover (Ref. 13, pp. 1, 8, 9).

Many species of birds have landed in and been detrimentally affected by the active waste pond, smut piles, barium sulfate piles, red river, and gypsum piles (Ref. 24, pp. 10, 11, 12). A few species have been specifically observed nesting on the site and studied (Ref. 10, pp. 4-26 to 4-31). This includes the Snowy Plover, American Avocet, and Horned Lark (Ref. 10, pp. 4-26 to 4-31). The inactive waste pond was favored by the Snowy Plover (Ref. 10, p. 4-30). The inactive waste pond has documented Snowy Plover nests containing contaminated eggs (Ref. 10, pp. 4-26 to 4-31). Eggs were also sampled from the nests of the American Avocet and Horned Lark (Ref. 10, pp. 4-26 to 4-33). The concentrations of PCBs in all species of birds eggs sampled were found to exceed concentrations shown to cause adverse effects to bird embryos. Some bird eggs also had hexachlorobenzene concentrations sufficient to cause severe toxicity to eggs (Ref. 10, pp. 4-32, 4-33).

Area Letter	Terrestrial Sensitive Environment	Assigned Value (Ref. 1, Table 5-5)	Reference
A	Habitat for American White Pelican: state sensitive species*	50 each	9, p. 5; 10, pp. 2-7 to 2-12; 11, pp. 1-9; 24, p. 10
	Habitat for Long-billed Curlew: state sensitive species*		
	Snowy Plover habitat: unique biotic community	25	13, pp. 8, 9

Note: * The Utah state designation process for "sensitive species" is functionally equivalent to the Federal Endangered or Threatened species designation process (Ref. 9).

Calculation of Terrestrial Sensitive Environment Factor Value (HRS Section 5.1.3.5)

Likelihood of exposure factor category value (LE): 550
Waste characteristics factor category value (WC): 100
Terrestrial sensitive environments value (ES): 125
Product (LE x WC x ES): 6,875,000
(LE x WC x ES)/82,500=83.33

If result is >60, (60) (82500)/(LE)(WC) = EC =90

Terrestrial Sensitive Environments Factor Value: 90

5.2 NEARBY POPULATION THREAT

Not scored.

6.0 AIR MIGRATION PATHWAY

6.1 LIKELIHOOD OF RELEASE

6.1.1 OBSERVED RELEASE

Direct Observation

Basis for Direct Observation: Under direction from EPA, START2 members Henry Schmelzer and Cordel Schmidt arrived at the USM facility on May 25, 2001, with EPA RCRA Enforcement Specialist John Works, Utah Division of Solid and Hazardous Waste (UDSHW) representative Eric Baiden, and two representatives from the Utah Occupational Safety and Health (UOSH) office (Ref. 6, p. 4). Upon arrival at the site, the team noted that the air in the parking lot (located on the south side of the facility) smelled slightly sweet and then smelled chlorine-like after several minutes (Ref. 6, p. 4).

At 1120 hours the entry team was escorted by six USM representatives, including the USM safety manager Leonard Taynon, into a courtyard area where anode dust boxes #1 through #4 are located (Ref. 6, p. 4). At 1145 hours two USM personnel dressed in level C personal protective equipment (PPE) unbolted the cover plate to anode dust box #4 (Ref. 6, p. 4). A large green dust cloud, which dispersed over the personnel and into the courtyard, was emitted upon the removal of the cover plate (Refs. 6, p. 4, photo 5; 18, pp. 1, 2). The anode dust sampled by START2 was observed to be very light and easily spread by slight winds (Ref. 6, pp. 4, 14, photo 5).

The anode dust material was shoveled from the dust box and into a "super sack" by USM personnel, and was transported by a fork lift within the courtyard area to a 55-gallon poly drum and emptied into the drum (Ref. 6, p. 5, photos 9 and 12). The 55-gallon poly drum was labeled "Hazardous Waste" by USM personnel (Ref. 6, p. 5). A release to air is visible during this process in photo 5 of reference 6 (Ref. 6, p. 4, photo 5).

At 1239 hours the sampling team obtained a sample in the same manner as described above at anode dust box #1 (Ref. 6, p. 5). During those operations, alarms sounded on personal chlorine monitors carried by START2 personnel within the ambient air breathing zone with readings observed as high as 8.4 ppm (Ref. 6, p. 5). Intermittent chlorine gas clouds emitted by USM plant processes that passed through the work zone are suspected to be the cause of those ambient air chlorine readings (Ref. 6, p. 5).

During the September 12, 2003 inspection, EPA personnel experienced an exposure of chlorine gas or hydrochloric acid gas as they were walking from one building to another (Ref. 26, p. 3). They again experienced a chlorine gas/HCL gas exposure once inside the melt reactor building where large clouds of dust were being emitted (Ref. 26, p. 3). One EPA Inspector experienced an exposure during the inspection causing occupational asthma and vocal cord dysfunction (Ref. 27, pp. 5, 6). The exposure reduced his lung capacity to about 32 percent, and he is no longer allowed to go into the field as an inspector at facilities with irritant gases (Ref. 26, pp. 5, 6). He had to change jobs at EPA because of this injury (Ref. 27, pp. 5, 6).

An observed release by direct observation is documented when a material that contains one or more hazardous substances has been seen entering the atmosphere directly (Ref. 1, p. 51651). When evidence supports the inference of a release of a material that contains one or more hazardous substances by the site to the atmosphere, demonstrated adverse effects accumulated with that release may be used to establish an observed release (Ref. 1, p. 51651).

- Hazardous Substances in Release:

Hazardous Substance	Evidence	Reference
PCBs	The presence of these contaminants in samples MC-DU-01/04 collected in	Ref. 6, Figure 2, pp. 4, 5, 14, photo 5, App. B, pp. 74, 75,

Hazardous Substance	Evidence	Reference
Hexachlorobenzene	2001	171-172, 173-174

Chemical Analysis

Not evaluated for this HRS documentation record.

Hazardous Substances Released

It should be noted that the hazardous substances released are those that were present in the observed release documented during the May 25, 2001 inspection as well as materials that are discharged under the TRI permit (including materials that are discharged but not permitted) (Ref. 8). Not all materials that are discharged are permitted. Sampling performed during the site visit on May 25, 2001, at anode dust boxes #1 and #4, indicated that observed dioxin/furan, PCB, and HCB amounts were the highest detected on site at 13.25 ppb, 57,111 ppb, and 2,000 J ppm, respectively (Ref. 6, pp. 13, 14, Figure 2, App. B, pp. 74, 173, 174). The anode dust box samples are also the only samples presented in this report that were analyzed for TAL Total and TCLP metals (Ref. 6, p. 14). Total iron content in sample MC-DU-01 (anode dust box #1) was 120,000 ppm and TCLP arsenic content was observed at 5.5 ppm (Ref. 6, p. 14). Also, TCLP chromium in samples MC-DU-01 and MC-DU-04 (anode dust box #4) was observed at 19 ppm and 11 ppm, respectively (Ref. 6, p. 14). Dioxin, furan, chromium, and iron are not included in the observed release, but are presented as supplementary information. In addition, iron is not a CERCLA hazardous substance. Anode dust material is considered a hazardous waste with regard to its ability to leach hazardous material beyond EPA regulatory limits (Ref. 6, p. 14). Anode dust was also observed by START2 to spread easily when it became airborne in a slight wind (Ref. 6, p. 14). Non-visible chlorine gas caused START2 chlorine monitors to alarm at 8.4 ppm (Ref. 6, p. 14).

Air Observed Release Factor Value: 550

Other Supporting Data

During sampling activities in September 2002, chlorine gas was detected in the ambient air on site at concentrations as high as 8.75 ppm in the outlying ditch areas (Ref. 5, pp. 4, 14). In addition, chlorine gas monitors indicated readings off the scale (>20ppm) during oversight activities at anode box #1 and the Ducon sump (Ref. 5, p. 14). For comparison, the National Institute for Occupational Safety and Health (NIOSH) indicates that a recommended exposure limit (REL) ceiling for chlorine gas in ambient air is 0.5 ppm for a 15 minute time-weighted average (TWA) and the immediately dangerous to life and health (IDLH) concentration for chlorine gas is 10 ppm (Refs. 5, p. 14; 6, p. 14).

6.1.2 POTENTIAL TO RELEASE

Potential to release not evaluated: Observed Release was documented.

6.2 WASTE CHARACTERISTICS

6.2.1 TOXICITY/MOBILITY

Hazardous Substance	Source No.	Toxicity Factor Value	Gas Mobility Factor Value	Particulate Mobility Factor Value	Toxicity/ Mobility Factor Value (Ref. 1, Table 6-13)	Refs.
PCBs	1, 2, 3,4	10,000	N/A	0.02	200	1, p. 51655; 2, BI-10
Hexachlorobenzene	1, 2, 3,4	1,000	1	N/A	1,000	2, BI-7

Notes: "N/A" Not applicable

Toxicity/Mobility Factor Value: 1,000

6.2.2 HAZARDOUS WASTE QUANTITY

Source No.	Source Type	Source Hazardous Waste Quantity
1	pile	4,020,923.08
2	pile	1,340,307.69
3	container	>0 but total amount unknown
4	other	>0 but total amount unknown

Sum of Values: 5,361,230.77

Hazardous Waste Quantity Factor Value: 1,000,000
(Ref. 1, Table 2-6)

6.2.3 WASTE CHARACTERISTICS FACTOR CATEGORY VALUE

Toxicity/mobility Factor Value: 1,000
Hazardous Waste Quantity Factor Value: 1,000,000

Toxicity/mobility Factor Value x
Hazardous Waste Quantity Factor Value: 1×10^9

Waste Characteristics Factor Category Value: 100
(Ref. 1, Table 2-7)

6.3 TARGETS

Level I Concentrations

Although an observed release has been documented for the USM site to air, the criteria have not been met to evaluate targets at Level I concentrations.

Level II Distance Categories

Sample ID: MC-DU-01; MC-DU-04
Location: anode boxes
Reference: Refs. 4, p. 2; 25; 30, pp. 8-10

Source: anode boxes
Distance from the source in miles: 0.01
Reference: 6, photos 1-12; 18, pp. 1, 2; 25
Distance categories subject to Level II concentrations: 0-1/4 mile

6.3.1 NEAREST INDIVIDUAL

Nearest Individual - Level I Concentrations
Residence, building or area subject to Level I concentrations:
Location: No Level I concentrations have been documented.

Nearest Individual - Level II Concentrations
The workers who are present in the anode courtyard area near the anode boxes, during and between times when anode dust is removed from the anode dust boxes (Ref. 27, p. 13)
Residence, building or area subject to Level II concentrations:
Location: anode box courtyard (Refs. 18; 6, photos 1-12; 25)
Source: 3
Distance from the nearest source in miles: 0.01 (Refs. 18; 6, photos 1-12; 25)
References: 6, photo 5; 7, photos 17, 25; 25.

Nearest Individual - Potential Contamination
Residence, building or area nearest to source:
Location: No potential contamination has been documented.

Nearest Individual Factor Value: 45

6.3.2 POPULATION

6.3.2.2 Level I Concentrations

Level I Population Targets

No Level I concentration targets were identified for the USM site.

Level I Concentrations Factor Value: 0

6.3.2.3 Level II Concentrations

Level II Population Targets

The USM facility currently employs approximately 400 workers (Refs. 7, p. 6; 28). The buildings that are occupied by employees are all located within one quarter mile of the emissions stack (Refs. 7, photo 1; 25). In addition, all of the workers must enter and exit the facility within one quarter mile of the stack at the beginning and end of each shift (Refs. 7, photo 1; 25). Of the workers, 30 were included in a toxicological evaluation and risk assessment to determine the impact, if any, from contact with contaminants onsite (Ref. 14, pp. 4, 11-14). Elevated worker blood levels were found for hexachlorobenzene (HCB) and dioxins (Ref. 7, pp. 1, 2). When comparing worker blood levels for HCB over a two year period of management mitigation efforts, no decrease was observed in workers, which would be expected with HCB. In fact, the HCB levels increased in all workers (Ref. 7, p. 35). Employees that did not work in the production areas, such as clerical workers, had a mean blood concentration of HCB ten times higher than levels detected in production employees (Ref. 7, p. 33). The administratively classified non-production workers were found to include women of childbearing age and are a particularly sensitive population (Ref. 7, p. 34). The anode (grizzly) box dust on the outside of the building in the courtyard is physically removed by a shovel outside releasing the dust to the ambient air and the soil (Refs. 7, p. 7, photo 17; 18, p. 2). Near the releases caused by removal of anode dust from the grizzly boxes, evidence of non-protected workers smoking was found (Ref. 7, p. 43 photo 17). In a later, reevaluation of the risk assessment, it was concluded that health risks were higher than previously reported (Ref. 14, pp. 5, 6). On April 17, 2008, workers called in to report releases of chlorine and sulfuric acid outdoors from over 80,000 gallons of waste poured directly into the Red River drainage ditch that killed birds flying over the plant (Ref. 20, pp. 1, 2). They also reported the company uses improper procedures and protocol when dealing with hazardous materials that are affecting workers and the environment (Ref. 20, p. 2). The report stated that when workers were injured with burns and respiratory problems from hazardous wastes on the job, they would be fired if they made a complaint or filed a report (Ref. 20, p. 2).

Distance Category	Population	Reference
On source and greater than 0-1/4 mile	400	6, pp. 6, 13, 14, 22, 24, photo 5; 7, p. 6, photos 17, 25; 24, pp. 7, 8, 9; 25; 28

Sum of Population Exposed to Level II Concentrations: 400

Level II Concentrations Factor Value: 400

6.3.2.4. Potential Contamination

Potential Population Targets

No potential population targets were identified with the USM site.

Potential Contamination Factor Value: 0

6.3.3 RESOURCES

No resource value was assigned, as no commercial agriculture, silviculture, or major recreational area was identified in association with the USM sources.

Resources Factor Value: 0

6.3.4 SENSITIVE ENVIRONMENTS

The State of Utah's Division of Wildlife Resources' Administrative Rule R657-48 requires development of the Utah Sensitive Species List (Ref. 9, p. 1). By Rule, wildlife species that are federally listed, candidates for federal listing, or for which a conservation agreement is in place automatically qualify for the Utah Sensitive Species List (Ref. 9, p. 1). Additional species that qualify for the list are "wildlife species of concern," species for which there is credible scientific evidence to substantiate at threat to continued population viability (Ref. 9, p. 1). The Wildlife Species of Concern and Habitat Designation Committee within the Utah Department of Natural Resources was established by the Rule to define the Utah Sensitive Species List and procedures for designation of state wildlife species of concern as part of a process to preclude listing under the Endangered Species Act (Ref. 9 p. 1, Appendix B).

The ranges of several Utah sensitive species (the Long-billed Curlew [*Numenius americanus*] and American White Pelican [*Pelecanus erythrorhynchos*]) are found in the USM facility study area (Refs. 9, p. 5; 10, pp. 2-7 to 2-12; 24, p. 10). A report from 2007 has documented the presence of both these species in the general vicinity of the site (Ref. 10, pp. 2-7 and 2-8). Long-billed Curlews have been observed in the area of the inactive waste impoundment and American White Pelicans have been observed coming into contact with facility wastewaters in the active surface impoundment (Refs. 10, pp. 2-3, 2-7 to 2-12; 24, p. 10). Additionally, the U. S. Fish and Wildlife has issued onsite Migratory Bird Rehabilitation Permits that require USM to submit annual reports (Ref. 11, pp. 1-11). These reports documented the death and disposal of several American White Pelicans onsite between 2002 and 2007 (Refs. 11, pp. 1-9; 24, p. 10). Incidents of birds dying after contact with the source of waste (the main ditch, or "red river") in the current impoundment have been reported by inspectors (Ref. 15). On April 17, 2008, workers called in to the National Response Center to report releases of chlorine and sulfuric acid outdoors from over 80,000 gallons of waste poured directly into the Red River drainage ditch that killed birds flying over the plant (Ref. 20, pp. 1, 2). They also reported the company uses improper procedures and protocol when dealing with hazardous materials that are affecting workers and the environment (Ref. 20, p. 2).

Also, the range of the Snowy Plover (*Charadrius alexandrinus*) has been identified in the immediate area of the inactive impoundment (Ref. 10, pp. 2-7 to 2-12). The Snowy Plover's breeding habitat in the Great Plains is typified by alkali and dry mudflats, and sandy areas along river channels (Ref. 12, p. 1). The immediate study area has been described as a relatively small in size area that is important to the maintenance of unique biotic communities such as the Snowy Plover (Ref. 13, pp. 1, 8, 9). Even though many species of birds have landed in and been detrimentally affected by the active waste pond, smut piles, barium sulfate piles, red river, and gypsum piles, they have insufficient food resources or habitat for long-term wildlife habitat (Refs. 11, pp. 2-9; 17, p. 5; 15; 24, pp. 10, 11, 12). However, this excludes the inactive waste pond that has documented Snowy Plover nests containing contaminated eggs (Refs. 11, pp. 2-9; 17, p. 5; 10, pp. 4-28, 4-29, 4-30, 4-31). Eggs were sampled from the nests of the Snowy Plover, the American Avocet, and Horned Lark (Ref. 10, p. 4-30). The concentrations of PCBs in all species of birds eggs sampled were found to exceed concentrations shown to cause adverse effects to bird embryos (Ref. 10, pp. 4-30 and 4-31). Some bird eggs also had hexachlorobenzene concentrations sufficient to cause severe toxicity to eggs (Ref. 10, pp. 4-32, 4-33).

6.3.4.1 Actual Contamination

Sensitive Environments

Sensitive Environment	Distance Category	Reference	Sensitive Environment Value (Ref. 1, Table 4-23)
American White Pelican: state sensitive species*	0 - 1/4	9, p. 5; 11, pp. 1-9; 15; 24, p. 10	50
Long-billed Curlew: state sensitive species*	0 – 1/4	9, p. 5	50
Snowy Plover habitat: unique biotic community	0 – 1/4	13, pp. 8, 9	25

Notes: * The Utah state designation process for "sensitive species" is functionally equivalent to the Federal Endangered or Threatened species designation process (Ref. 9).

Sum of Sensitive Environments Value: 125

Wetlands

No wetlands were identified with the USM site.

Total Wetland Acreage: 0

Wetland Acreage Value (Ref. 1, Table 6-18):

Sensitive Environment Actual Contamination Factor Value: 125

6.3.4.2 Potential Contamination

No potential targets were evaluated at this time in association with the USM site.

Sensitive Environments Potential Contamination Factor Value: 0

Calculation of Sensitive Environment Factor Value (HRS Section 6.3.4.3)

Likelihood of exposure factor category value (LE): 550
Waste characteristics factor category value (WC): 100
Sum of actual and potential contamination (EB): 125
Product (LE x WC x EB): 6,875,000
(LE x WC x ES)/82,500 = 83.33

If result is >60, Value of EC:
(60) (82500)/(LE)(WC) = EC =90

Sensitive Environment Factor Value= 90